

REMARKS

***Summary of the Amendment***

Upon entry of the above amendment, claims 18-29 are canceled, claims 1, 3, 5, 10-12, 16, 30 and 31 are amended, and claims 32 and 33 are added. No new matter is added. Support for the amendment to claims 1 and 30 and for new claims 32 and 33 can be found on paragraphs [0019], [0025], [0028] and [0033]. Accordingly, claims 1-17 and 30-33 will be pending with claims 1, 10-12, 30 and 31 being in independent form.

***Allowable Claims***

Inasmuch as the Examiner rejected claims 10-12 and 31 only on the basis of 35 U.S.C. Section 112, second paragraph, and inasmuch as Applicant has addressed this rejection and presented claims 10-12 and 31 in independent form, Applicant respectfully requests that at least claims 10-12 and 31 be indicated to be allowed.

***35 U.S.C. § 112 Rejection***

The Examiner rejected claims 10-12 and 31 under 35 U.S.C. § 112, second paragraph, as being indefinite. Applicant respectfully traverses this rejection and the Examiner's assertions of indefiniteness.

With regard to claims 10 and 11, Applicant notes that Fig. 2A and paragraph [0028] explain what is meant by the recited minimum spacing. Applicant submits that such disclosure coupled with the knowledge possessed by one having ordinary skill in

the art provides sufficient explanation of what is meant by the features recited in claims 10 and 11, and the Examiner has not shown otherwise.

With regard to claims 12 and 31, Applicant again notes that Fig. 2A and paragraph [0028] explain how the recited dummy shape density can be achieved, i.e., using the minimum spacing. Applicant submits that such disclosure coupled with the knowledge possessed by one having ordinary skill in the art provides sufficient explanation of what is meant by the features recited in claims 12 and 31, and the Examiner has not shown otherwise.

Applicant requests that the Examiner reconsider and withdraw the Section 112, second paragraph, rejection of the above-noted claims.

***Traversal of Rejection Under 35 U.S.C. § 102(b)***

The Examiner rejected claim 30 under 35 U.S.C. § 102(b) as being anticipated by US patent 6,468,894 to YANG et al.

The Examiner asserted that YANG discloses all of the features recited in these claims including the recited first and second rigid dielectric layers 17 and 23 and the interconnect 36. Applicant respectfully traverses this rejection.

Notwithstanding the Office Action assertions as to what YANG discloses, or even suggests, Applicant submits that YANG fails to disclose, or even suggest, for example, forming a plurality of dummy metal fill shapes in the first non-rigid dielectric wiring level in proximity to the interconnect, wherein the interconnect is in contact with a portion of the first rigid dielectric layer and with a portion of the second rigid dielectric layer, and

preventing, with the dummy metal fill shapes, portions of the first and second rigid dielectric layers adjacent the interconnect from de-layering away from the interconnect (claim 30).

Applicant does not dispute that Fig. 7 of YANG shows interconnects 30 connecting layers 14 and 28. Nor does Applicant dispute that Fig. 7 shows dummy fill shapes 32, 34 and 36 arranged between these two layers 14 and 28. However, it is clear from col. 5, lines 31-48, that the dummy fill shapes 32, 34 and 36 are not interconnects. Furthermore, it is clear from this language that the dummy fill shapes 32, 34 and 36 do not act to prevent portions of the two layers 14 and 28 from de-layering away from the interconnect. Applicant notes, in particular, that col. 5, lines 39-41 specifically indicates as follows:

The dummy via 32 is a floating dummy via since it is not connected to any of the first or second metal lines 14, 28.

Moreover, col. 5, lines 42-47 specifically indicates as follows:

Via 34 may be considered a bottom floating dummy via since the via 34 is not connected to a first metal line 14, but is connected to a second metal line 28. Conversely, via 36 is considered a top floating dummy via since it is connected to a first metal line 14 but is not connected to a second metal line 28.

Applicant emphasizes that this language clearly indicates that the dummy fill shapes 32, 34 and 36 do not connect the layers 14 and 28. Moreover, because each dummy fill shape is only connected to one of the layers 14 and 28, the dummy fill shapes do not act to prevent portions of the two layers 14 and 28 from de-layering away from the interconnects 30.

Additionally, while the Examiner has identified layers 17 and 23 as the first and second rigid dielectric layers, the Examiner has failed to note that these layers are merely disclosed as being etch stop layers. Nor has the Examiner appreciated the fact that none of the interconnects 30 shown in Fig. 7 are connected to both of the layers 17 and 23 (see col. 4, lines 56-58). Finally, the Examiner has not demonstrated how, using these layers 17 and 23, the device shown in Fig. 7 is capable of preventing, with the dummy metal fill shapes, portions of the first and second rigid dielectric layers adjacent the interconnect from de-layering away from the interconnect.

Thus, Applicant submits that the above-noted claim is not disclosed, or even suggested, by any proper reading of YANG. Applicant therefore requests that the Examiner reconsider and withdraw the rejection of the above-noted claim under 35 U.S.C. § 102(b).

***Traversal of Rejections Under 35 U.S.C. § 103(a)***

**Over Yang with Yu**

The Examiner rejected claims 1-9, 13, 14 and 17 under 35 U.S.C. § 103(a) as unpatentable over YANG in view of US patent 6,258,715 to YU et al.

The Examiner acknowledged that YANG lacks, among other features, the low  $k$  dielectric having dummy fill shapes. However, the Examiner asserted that this feature is disclosed in YU and that it would have been obvious to one having ordinary skill in the art to combine the teachings of these documents. Applicant respectfully disagrees with the Examiner's assertions and traverses this rejection.

Notwithstanding the Examiner's assertion as to what each of YANG and YU discloses or suggests, Applicant submits that no proper combination of YANG and YU discloses or suggests, for example, a structural securing means associated with the first non-rigid dielectric wiring level, the structural securing means connecting together the portions of the first and rigid dielectric layers above and below the first non-rigid dielectric wiring level so that the portions of the first and second rigid dielectric layers adjacent the interconnect are prevented from de-layering from the interconnect alone or in combination with a low-k dielectric layer having dummy fill shapes arranged above the second rigid dielectric layer (claim 1).

As explained above, while YANG shows interconnects 30 connecting layers 14 and 28 and dummy fill shapes 32, 34 and 36 arranged between these two layers 14 and 28, it is clear from col. 5, lines 31-48, that the dummy fill shapes 32, 34 and 36 are not interconnects. Furthermore, it is clear from this language that the dummy fill shapes 32, 34 and 36 do not act to prevent portions of the two layers 14 and 28 from de-layering away from the interconnect.

Again, col. 5, lines 39-41 specifically indicates as follows:

The dummy via 32 is a floating dummy via since it is not connected to any of the first or second metal lines 14, 28.

Col. 5, lines 42-47 specifically indicates as follows:

Via 34 may be considered a bottom floating dummy via since the via 34 is not connected to a first metal line 14, but is connected to a second metal line 28. Conversely, via 36 is considered a top floating dummy via since it is connected to a first metal line 14 but is not connected to a second metal line 28.

Thus, Applicant again emphasizes that this language clearly indicates that the dummy fill shapes 32, 34 and 36 do not connect the layers 14 and 28. Moreover, because each dummy fill shape is only connected to one of the layers 14 and 28, the dummy fill shapes do not act to prevent portions of the two layers 14 and 28 from de-layering away from the interconnects 30. Additionally, while the Examiner has identified layers 17 and 23 as the first and second rigid dielectric layers, the Examiner has failed to consider that these layers are merely disclosed as being etch stop layers. Nor has the Examiner appreciated the fact that none of the interconnects 30 shown in Fig. 7 are connected to both of the layers 17 and 23. Finally, the Examiner has not demonstrated how, using these layers 17 and 23, the device shown in Fig. 7 is capable of connecting together the portions of the first and rigid dielectric layers above and below the first non-rigid dielectric wiring level so that the portions of the first and second rigid dielectric layers adjacent the interconnect are prevented from de-layering from the interconnect.

With regard to YU, Applicant acknowledges that this document apparently discloses the use of dummy fill shapes 23 in a low k dielectric layer 26 (see col. 3, lines 61-62 and col. 1, lines 12-16). However, the Examiner has failed to identify any disclosure in YU with regard to connecting first and second rigid dielectric layers with dummy fill shapes. Nor has the Examiner identified any disclosure in YU with regard to using the dummy fill shapes to prevent portions of the two layers from de-layering away from an interconnect. Finally, the Examiner has not demonstrated how the devices shown in YU are capable of connecting together the portions of the first and rigid dielectric layers above and below the first non-rigid dielectric wiring level so that the

portions of the first and second rigid dielectric layers adjacent the interconnect are prevented from de-layering from the interconnect.

Applicant directs the Examiner's attention to the guidelines identified in M.P.E.P section 2141 which state that

"[i]n determining the propriety of the Patent Office case for obviousness in the first instance, it is necessary to ascertain whether or not the reference teachings would appear to be sufficient for one of ordinary skill in the relevant art having the reference before him to make the proposed substitution, combination, or other modification." *In re Linter*, 458 F.2d 1013, 1016, 173 USPQ 560, 562 (CCPA 1972).

As this section clearly indicates,

"[o]bviousness can only be established by combining or modifying the teachings of the prior art to produce the claimed invention where there is some teaching, suggestion, or motivation to do so found either in the references themselves or in the knowledge generally available to one of ordinary skill in the art. *In re Fine*, 837 F.2d 1071, 5 USPQ2d 1596 (Fed. Cir. 1988); *In re Jones*, 958 F.2d 347, 21 USPQ2d 1941 (Fed. Cir. 1992)."

Moreover, it has been legally established that

"[t]he mere fact that references can be combined or modified does not render the resultant combination obvious unless the prior art also suggests the desirability of the combination. *In re Mills*, 916 F.2d 680, 16 USPQ2d 1430 (Fed. Cir. 1990) .... Although a prior art device 'may be capable of being modified to run the way the apparatus is claimed, there must be a suggestion or motivation in the reference to do so. 916 F.2d at 682, 16 USPQ2d at 1432.).' See also *In re Fritch*, 972 F.2d 1260, 23 USPQ2d 1780 (Fed. Cir. 1992) (flexible landscape edging device which is conformable to a ground surface of varying slope not suggested by combination of prior art references)."

Additionally, it has been held that

"[a] statement that modifications of the prior art to meet the claimed invention would have been well within the ordinary skill of the art at the

time the claimed invention was made because the references relied upon teach that all aspects of the claimed invention were individually known in the art is not sufficient to establish a *prima facie* case of obviousness without some objective reason to combine the teachings of the references. *Ex parte Levengood*, 28 USPQ2d 1300 (Bd. Pat. App. & Inter. 1993)."

Moreover, Applicant submits that there is no motivation to modify YANG in a manner which would render obvious Applicant's invention, and additionally, Applicant submits that there is no motivation or rationale disclosed or suggested in the prior art to modify the applied reference in the manner suggested by the Examiner. The Examiner's opinion does not provide a proper basis for these features or for the motivation to modify this document in the manner suggested by the Examiner.

Therefore, Applicant submits that the invention as recited in at least independent claim 1 is not rendered obvious by any reasonable inspection and interpretation of the disclosure of the applied reference.

Furthermore, Applicant submits that dependent claims 2-9, 13, 14 and 17 are allowable at least for the reason that these claims depend from allowable base claim 1 and because these claims recite additional features that further define the present invention. In particular, Applicant submits that no proper combination of YANG and YU discloses or suggests, in combination: the features recited in these claims such as:

That the structural securing means comprises at least one dummy fill shape in proximity to the interconnect having a coefficient of thermal expansion better matched to the first and second rigid dielectric layers than that of the first non-rigid dielectric wiring level (claim 2).

That the at least one dummy fill shape is an alloy predominately composed of one of copper, aluminum and tungsten (claim 3).

That an effective CTE of a region of the first non-rigid dielectric wiring level is reduced in proportion to a density of the at least one dummy fill shape (claim 4).

That the structural securing means is a plurality of dummy fill shapes aligned in rows and columns about the interconnect (claim 5).

That structural securing means is matched to an overall average local metal density such that CTE mismatch stresses and deflections are substantially toward zero (claim 6).

That the structural securing means reduces temperature-driven stress (claim 7). That the structural securing means inhibits deflecting of the first and second rigid dielectric layers (claim 8).

That the interconnect has a line width from 0.1 microns to greater than 1 micron, that the structural securing means are dummy fill shapes adjacent to the interconnect, that the dummy fill shapes are one of an alloy substantially composed of aluminum, copper and tungsten, and that the dummy fill shapes are electrically isolated from each other and the interconnect (claim 9).

That a width and length of the dummy fill shapes are 3x a minimum line width of the interconnect (claim 13).

That the structural securing means are dummy fill shapes arranged in a staggered offset pattern surrounding the interconnect (claim 14).

That structural securing means is a plurality of square shaped dummy fill shapes arranged in a staggered pattern in the first non-rigid dielectric wiring level (claim 15).

Applicant requests that the Examiner reconsider and withdraw the rejection of the above-noted claims under 35 U.S.C. § 103(a).

Over Yang with Yu and Zhou

Applicant respectfully traverses the rejection of claims 15 and 16 under 35 U.S.C. § 103(a) as unpatentable over YANG in view of YU and further in view of US

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patent 6,287,979 to ZHOU et al.

The Examiner acknowledged that YANG and YU lacks, among other things, the materials recited in these claims. However, the Examiner asserted that such materials are taught in ZHOU and that it would have been obvious to one having ordinary skill in the art to combine the teachings of these documents. Applicant respectfully disagrees with the Examiner's assertions and traverses this rejection.

Applicant submits that dependent claims 15 and 16 are allowable at least for the reason that these claims depend from an allowable base claim and because these claims recite additional features that further define the present invention. In particular, Applicant submits that no proper reading or combination of YANG, YU and ZHOU discloses or suggests, in combination: the features recited in claims 15 and 16 in combination with the features recited in amended claim 1.

In addition to the reasons indicated above with regard to YANG and YU, Applicant submits that ZHOU also fails to disclose or suggest the invention recited in independent claim 1.

Applicant notes, for example, that the Examiner has not identified any language or figure in ZHOU which discloses or suggests connecting first and second rigid dielectric layers with dummy fill shapes. Nor has the Examiner identified any disclosure in ZHOU with regard to using the dummy fill shapes to prevent portions of the two layers from de-layering away from an interconnect. Finally, the Examiner has not demonstrated how the devices shown in ZHOU are capable of connecting together the portions of the first and rigid dielectric layers above and below the first non-rigid

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dielectric wiring level so that the portions of the first and second rigid dielectric layers adjacent the interconnect are prevented from de-layering from the interconnect.

Applicant respectfully submits that the recited materials, in combination with the other features recited in claim 1, would not have been obvious to one having ordinary skill in the art and, furthermore, the recited materials, in combination with the features recited in claim 1 constitute an aspect of the invention which is not disclosed or suggested by any proper combination of these documents.

Applicant requests that the Examiner reconsider and withdraw the rejection of the above-noted claims under 35 U.S.C. § 103(a).

***New Claims are also Allowable***

Applicant submits that the new claims 32 and 33 are allowable over the applied art of record. Claims 32 and 33 depend from claims which are believed to be allowable over the applied documents and further recite a combination of features which are clearly not disclosed or suggested by the applied art of record. Accordingly, Applicant respectfully requests consideration of these claims and further request that the above-noted claims be indicated as being allowable.

**CONCLUSION**

In view of the foregoing amendments and remarks, Applicant submits that all of the claims are patentably distinct from the prior art of record and are in condition for allowance. The Examiner is respectfully requested to pass the above application to

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issue. The Examiner is invited to contact the undersigned at the telephone number listed below, if needed. Applicant hereby makes a written conditional petition for extension of time, if required. Please charge any deficiencies in fees and credit any overpayment of fees to **IBM Deposit Account No. 09-0456**.

Respectfully submitted,  
H. LANDIS

A handwritten signature in black ink, appearing to read "H. Landis". The signature is fluid and cursive, with a large, stylized "H" at the beginning.

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